Has oxygen depletion an impact on nutrients and macrofauna in a highly dynamic macrophytodetritus accumulation?

PhD Student Poster Contest

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General framework

- *Posidonia oceanica* **seagrass ➔ phytodetritus** (300 to 2000 g.dry.wt.m^{-2}yr^{-1}), called "litter" ("QR code"1).
- Habitat for **macrofaunal community** (≈ 130 species).
- **Highly dynamic** ("QR code" 2).
- **Transient** low O_2 conditions.

1 2

Positive or negative effect?

Methods

- Revellata Bay, Calvi, **CORSICA**.
- 2 sampling sites (exported accumulations), 2 years, 8 seasons, 3(-4) water strata.
- **Standardized** sampling.
- Here: focus on **4 very dominant macro-invertebrates**.
- **Winkler** titration for O_2, **SKALAR** spectrophotometry for nutrients.

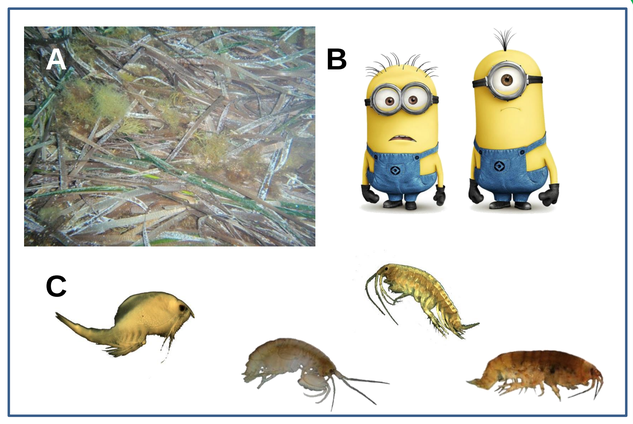

Fig 1 : A = *P.oceanica* litter accumulation; B = litter monsters ; C = the macro-invertebrates.

Results

A) Through years 2010-2012

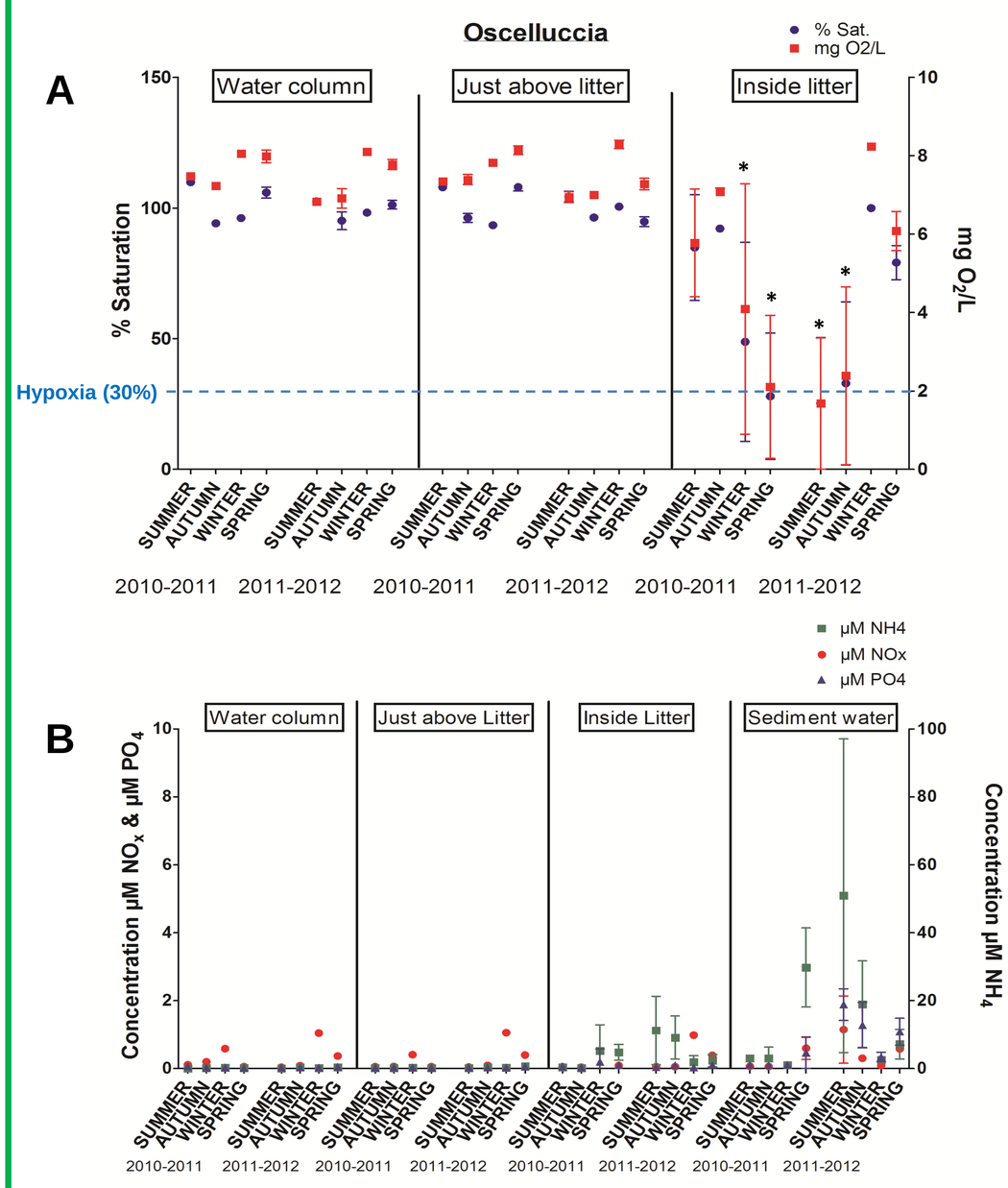

Fig 2 : **A**&**B** : seasonal and spatial evolution of (**A**) O_2 concentration/saturation and nutrients (**B**) for years 2010-2012 at **1 of the 2 sites** in the water column, in the water just above the litter and in the water inside the litter (plus sediment water for nutrients). ✱ = O_2 « debt ».

B) For the 4 dominant species

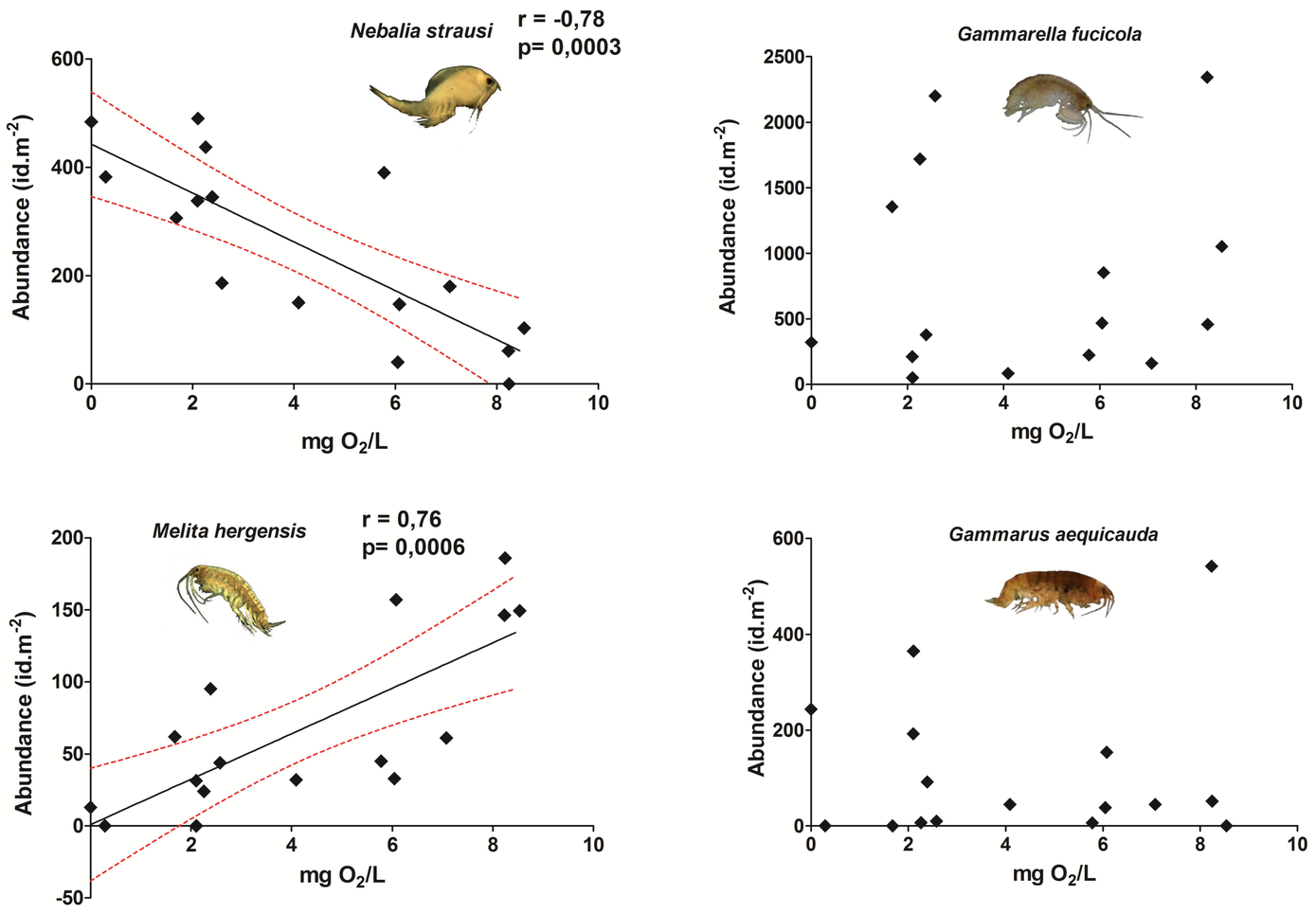

Fig 3 : correlation between O_2 concentration (mg O_2/L) inside the litter and the abundance of 4 important macro-invertebrates species : *Melita hergensis*, *Nebalia strausi, Gammarella fucicola* and *Gammarus aequicauda*. r= Spearman correlation; p = p value of Spearman correlation test. Solid black line : fitted correlation , dotted red curves : 95% positive and negative confidence bands.

In a few words :

- **Significant differences** for nutrients,O_2 % saturation and O_2 concentration, between sites, seasons and years **only for litter water** and sediment water (for nutrients only).
- **Highly significant** ($p<0,0001$) **positive** (NO_x) and **negative** (NH_4, PO_4) correlation between nutrients and O_2 concentration.

- **No significant correlation** for global macrofauna abundance (≈ 130 species) or global biodiversity (not shown).
- **No significant correlation** for 2 dominant amphipod species :*G. fucicola, G. aequicauda*.
- **Positive significant** correlation between **mg O_2/L** and the abundance of the amphipod, *M. hergensis.*
- **Negative significant** correlation between **mg O_2/L** and the abundance of the leptostracan, *N. strausi.*

Take home message

- Litter water ➔ **important spatio-temporal variations** of O_2 conditions.
- Effects of low O_2 conditions ➔ **not visible at a global macrofauna community scale**.
- Abundance of some dominant species not correlated with O_2 concentration, but some show significant **positive** or **negative** correlations ➔ **responses/tolerances species dependant + adaptation.**

- **Positive** or **negative** « responses » of nutrients to low O_2 conditions ➔ litter = **transitional layer** between water column and sediment?

➔ **Structuring role** of O_2 dynamics on the litter macrofauna community

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